

Office UNITED STATES PATENT AND TRADEMARK OFFICE Address: COMMISSIONER OF PATENTS AND TRADEMARKS Washington, D.C. 20231 www.uspto.gov		App 09/11/2002 OFFICE	
APPLICATION NO. Period 09/443,443	FILING DATE 11/22/1999	FIRST NAMED INVENTOR SCOTT K. POZDER	ATTORNEY DOCKET NO. SC10861TP
		CONFIRMATION NO. 7259	

7590 03/27/2002
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EXAMINER	
ESTRADA, MICHELLE	
ART UNIT	PAPER NUMBER

2823
 DATE MAILED: 03/27/2002

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/443,443

Applicant(s)

POZDER ET AL.

Examiner

Michelle Estrada

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 January 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-6,8-11 and 24-32 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-6,8-11 and 24-32 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s) _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-5, 10, 24-27, 30 and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Freeman, Jr. et al. and Lien.

Freeman, Jr. et al. disclose a method for forming a semiconductor device comprising forming an uppermost interconnect level that includes an interconnect portion which can be made of copper (13) and a bond pad over; forming a passivation layer (19) over the uppermost interconnect level, wherein removing portions of the passivation layer exposes portions of the bond pad (18) and forms a plurality of support structures overlying the uppermost surface of the bond pad; and forming a conductive capping layer (27) which can include aluminum overlying the plurality of support structures, wherein the conductive capping layer electrically contacts the bond pad (Col. 3, line 19- Col. 5, line 14); forming dielectric studs (14) within the bond pad (18) , wherein at least a portion of a support structure overlies a portion of a dielectric stud; wherein the plurality of support structures are interconnected with unremoved portions of the passivation layer. Furthermore, (14) are studs because they have vertical and lateral extent. The claims do not require the configuration of studs shown in figure 3. The reference also discloses that the bonding pad (10) conducts electrical signals into

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and out of the integrated circuit located on the remainder of the semiconductor substrate (Col. 2, lines 15-18); wherein (19) is silicon oxide or any other suitable material (Col 3, lines 52-58).

Freeman, Jr. et al. do not disclose forming a first interconnect level over a semiconductor substrate; wherein the first interconnect level includes that the interconnect portion contacts the first interconnect level by way of vias through an interlevel dielectric layer, and wherein all vias interconnecting the interconnect portion and the first interconnect level are positioned outside regions directly below the bond pad.

Lien discloses forming a first interconnect level (210) over a semiconductor substrate; forming a bonding pad (216); wherein the first interconnect level includes that the interconnect portion contacts the first interconnect level by way of vias through an interlevel dielectric layer (206/207/208), and wherein all vias interconnecting the interconnect portion and the first interconnect level are positioned outside regions directly below the bond pad (See fig. 3); wherein the bonding pad is formed near an edge of the integrated circuit (Col. 1, lines 45-46).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of Freeman, Jr. et al. and Lien to achieve formation of interconnects in the bonding pad structure of Freeman, Jr. et al.

Claim 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Freeman, Jr. et al. and Lien as applied to claims 1-5, 10 24-27, 30 and 32 above, and further in view of Takiar et al.

The combination does not specifically disclose forming the bond pad over a dielectric layer having a Young's modulus less than approximately 50 Giga Pascals or having a low yield strength. Takiar et al. teach a method of forming a conductive bond pad including forming the bond pad over dielectric layers including silicon nitride, silicon oxynitride, polyimide, silicon nitride, and silicon dioxide. These materials are considered preferred materials in the instant application. (Col. 2, line 53- Col. 3, line 34). It would have been within the scope of one with ordinary skill in the art at the time of the invention to use the materials of Takiar et al. for their disclosed intended purpose in the process of the combination to form the dielectric layer upon which the conductive bond pad is formed.

Claims 8, 9, 28-29 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Freeman, Jr. et al. and Lien as applied to claims 1-5, 10 24-27, 30 and 32 above, and further in view of White.

The combination does not disclose forming a barrier layer, which includes a material, selected from the group consisting of tantalum, titanium, tungsten, and chromium between the capping layer (27) and the conductive bond pad (13). White teaches forming a conductive bond pad (22) with a capping layer (26) with a barrier layer (24) disposed there between. (24) is made of titanium-tungsten. It would have

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been within the scope of one with ordinary skill in the art at the time of the invention to employ the process of White for its disclosed intended purpose and the material of White for its disclosed intended purpose in the step of forming the conductive bond pad of the combination.

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Freeman, Jr. et al. and Lien as applied to claims 1-5, 10 24-27, 30 and 32 above, and further in view of Hwang et al.

The combination does not disclose forming the conductive capping layer (27) from a material selected from the group consisting of nickel and palladium. Hwang et al. teach the suitability of using nickel to form a capping layer over a bond pad. (Col. 3, lines 8-25 and Fig. 2). It would have been within the scope of one with ordinary skill in the art to use the material of Hwang et al. for its disclosed intended purpose to form the capping layer of the combination.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not


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mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michelle Estrada whose telephone number is 703-308-0729. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on 703-308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 (7724, 3431 and 3432) for regular communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.


George Fourson
Primary Examiner
Art Unit 2823


MEstrada
March 13, 2002